

WHAT IS CLAIMED IS:

1. A linear motor comprising:

first magnets arrayed such that polarization  
directions thereof are periodically opposite, second  
5 magnets arrayed adjacent to said first magnets such  
that polarization directions thereof are periodically  
opposite, and an electromagnetic coil opposing said  
first and second magnets to generate the Lorentz force  
by at least said first and second magnets,  
10 said second magnets being disposed such that the  
polarization directions thereof intersect those of said  
first magnets.

2. The linear motor according to claim 1, wherein  
the polarization directions of said second magnets  
15 intersect those of the first magnets at an angle of  
substantially 90°.

3. The linear motor according to claim 1, wherein  
said first and second magnets are rectangular  
parallelepiped permanent magnets.

20 4. The linear motor according to claim 1, wherein  
said electromagnetic coil comprises at least two  
electromagnetic coils disposed to oppose said first and  
second magnets and to be energized simultaneously.

5. The linear motor according to claim 1, wherein  
25 said first and second magnets are permanent magnets  
with the same shape.

6. The permanent magnet according to claim 1,

wherein either one of said first and second magnets which is disposed at a terminal end has a volume smaller than those of other magnets.

7. The linear motor according to claim 1, wherein  
5 said first and second magnets generate a sine wave magnetic field.

8. A stage apparatus comprising:

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10 a linear motor including first magnets arrayed such that polarization directions thereof are periodically opposite, second magnets arrayed adjacent to said first magnets such that polarization directions thereof are periodically opposite, and an electromagnetic coil opposing said first and second magnets to generate the Lorentz force by at least said  
15 first and second magnets, said second magnets being disposed such that the polarization directions thereof intersect those of said first magnets; and

a stage driven by said linear motor,

said electromagnetic coil being energized to move  
20 said electromagnetic coil and said first and second magnets relative to each other, thereby driving said stage.

9. An exposure apparatus comprising:

25 a linear motor including first magnets arrayed such that polarization directions thereof are periodically opposite, second magnets arrayed adjacent to said first magnets such that polarization directions

thereof are periodically opposite, and an  
electromagnetic coil opposing said first and second  
magnets to generate the Lorentz force by at least said  
first and second magnets, said second magnets being  
5 disposed such that the polarization directions thereof  
intersect those of said first magnets; and

a stage driven by said linear motor,

said electromagnetic coil being energized to move  
said electromagnetic coil and said first and second  
10 magnets relative to each other, thereby positioning  
either one or both of a substrate and a master with a  
stage apparatus comprising a linear motor.

~~10. A device manufacturing method, comprising;~~

positioning at least one of a substrate and a  
15 master on an exposure apparatus by controlling a stage  
apparatus comprising a linear motor including first  
magnets arrayed such that polarization directions  
thereof are periodically opposite, second magnets  
arrayed adjacent to the first magnets such that  
20 polarization directions thereof are periodically  
opposite, and an electromagnetic coil opposing the  
first and second magnets to generate the Lorentz force  
by at least the first and second magnets, the second  
magnets being disposed such that the polarization  
25 directions thereof intersect those of the first magnets,  
and a stage driven by the linear motor, the stage  
apparatus being adapted to drive the stage by

energizing the electromagnetic coil to move the  
electromagnetic coil and the first and second magnets  
relative to each other; and

transferring a pattern of said master onto said  
5 substrate.

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